**Linear Programming Notes**

**Linear Programming is a mathematical method for determining a way to achieve the best outcome (such as maximum profit or lowest cost) in a given** [**mathematical model**](http://en.wikipedia.org/wiki/Mathematical_model) **for some list of requirements represented as linear relationships.**

**Linear Programming involves writing and graphing systems of equations, finding the points of intersection, and using those points (vertices) to find a maximum or minimum value.**

**Example 1:** Find the values of *x* and *y* that maximize and minimize the objective function $P=3x+2y$ given the constraints below. What is the value of *P* at each vertex?

Constraints: Step 1: Put each equation in slope-intercept form.

Step 2: Graph all constraints. Step 3: Identify the corner points (vertices).

Step 4: Substitute the coordinates of each vertex into the profit equation.

Step 5: Use your values from Step 4 to answer the question.

**Example 2:** Find the values of *x* and *y* that maximize the objective function $P=4x+y$ given the constraints below. What is the value of *P* at each vertex?

Constraints: Step 1: Put each equation in slope-intercept form.

Step 2: Graph all constraints. Step 3: Identify the corner points (vertices).

Step 4: Substitute the coordinates of each vertex into the profit equation.

Step 5: Use your values from Step 4 to answer the question.

**Example 3:** A manufacturer of ski clothing makes ski pants and ski jackets. The profit on a pair of ski pants is $2.00 and on a jacket is $1.50. Both pants and jackets require the work of sewing operators and cutters. There are 60 minutes of sewing operator time and 48 minutes of cutter time available. It takes 8 minutes to sew one pair of ski pants and 4 minutes to sew one jacket. Cutters take 4 minutes on pants and 8 minutes on a jacket. Find the maximum profit and the amount of pants and jackets to maximize the profit.

I. Define variables. IV. Graph profit equation and constraints



II. Write profit equation.

III. Define constraints as a system of inequalities.

V. State the corner points (vertices) and

determine the profit at each vertex.

VI. Answer question as a complete sentence.

**Example 4:** A farmer has a field of 70 acres in which he plants potatoes and corn. The seed for potatoes costs $20/acre, the seed for corn costs $60/acre and the farmer has set aside $3000 to spend on seed. The profit per acre of potatoes is $150 and the profit for corn is $50 an acre. Find the optimal solution for the farmer.

I. Define variables. IV. Graph profit equation and constraints



II. Write profit equation.

III. Define constraints as a system of inequalities.

V. State the corner points (vertices) and

determine the profit at each vertex.

VI. Answer question as a complete sentence.